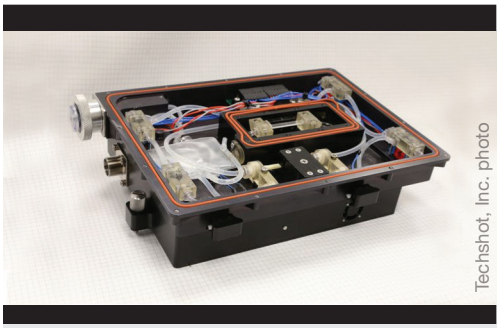
Observation Platform for Dynamic Biomedical and Biotechnology Experiments Using the International Space Station (ISS) Light Microscopy Module (LMM)


Techshot, Inc. photo

Innovation will greatly accelerate ISS biomedical experiments

Techshot, Inc., has developed an observation platform for the LMM on the ISS that will enable biomedical and biotechnology experiments. The LMM Dynamic Stage consists of an electronics module and the first two of a planned suite of experiment modules. Specimens and reagent solutions can be injected into a small, hollow microscope slide—the heart of the innovation—via a combination of small reservoirs, pumps, and valves.

A life science experiment module allows investigators to load up to two different fluids for on-orbit, real-time image cytometry. Fluids can be changed to initiate a process, fix biological samples, or retrieve suspended cells. A colloid science experiment module conducts microparticle and nanoparticle tests for investigation of colloid self-assembly phenomena. This module includes a hollow glass slide and heating elements for the creation of a thermal gradient from one end of the slide to the other. The electronics module supports both experiment modules and contains a unique illuminator/condenser for bright and dark field and phase contrast illumination, power supplies for two piezoelectric pumps, and controller boards for pumps and valves. This observation platform safely contains internal fluids and will greatly accelerate the research and development (R&D) cycle of numerous experiments, products, and services aboard the ISS.

Applications

NASA

- On-orbit analysis of cultured cells from biotechnology experiments
- Cultivation and analysis of microbial samples
- On-orbit blood analysis
- Real-time observations of cell growth and differentiation
- Colloid physical self-assembly and crystallization experiments

Commercial

- Magnetic cell separation and analysis technologies

Phase II Objectives

- Develop detailed technical requirements document
- Design and build components to space flight specifications:
  - Electronics module to fit cold plate of LMM
  - Life science experiment module
  - Colloid science experiment module
- Develop the LMM Dynamic Stage observation platform verification plan
- Test the observation platform subsystems using the verification plan
- Complete laboratory testing via specific biology and physics microscopy observations and ground experiments

Benefits

- Enables more versatile biomedical experiments aboard the ISS
- Accelerates R&D cycles for numerous experiments, products, and services
- Creates novel uses and users of the LMM on the ISS

Firm Contact

Techshot, Inc.
Michael A. (Andy) Kurk
akurk@techshot.com
7200 Highway 150
Greenville, IN 47124–9515
Phone: 812–923–9591 ext. 224

Proposal Number: 09-2 O3.03-9290